

1 1. A method for detecting a cancer in a brain tissue sample, the method
2 comprising the steps of:

3 (A) providing the brain tissue sample; and

4 (B) analyzing the brain tissue sample for a Fra-1 marker.

1 2. The method of claim 1, wherein the step (B) of analyzing the brain
2 tissue sample comprises comparing the quantity of expression of the Fra-1 marker to
3 a first sample known to express detectable levels of the Fra-1 marker and a second
4 sample known to not express detectable levels of the Fra-1 marker.

1 3. The method of claim 1, wherein the Fra-1 marker is a Fra-1 nucleic
2 acid.

1 4. The method of claim 3, wherein the Fra-1 marker is an RNA.

1 5. The method of claim 3, wherein the Fra-1 nucleic acid is a native Fra-1
2 nucleic acid.

1 6. The method of claim 3, wherein the step (A) of providing a tissue
2 sample comprises obtaining the brain tissue sample from a human subject; and the
3 step (B) of analyzing the brain tissue sample comprises isolating RNA from the tissue
4 sample, generating cDNAs from the isolated RNA, amplifying the cDNAs by PCR to
5 generate a PCR product.

1 7. The method of claim 3, wherein the step (A) of providing a brain
2 tissue sample comprises obtaining the tissue sample from a human subject; and the
3 step (B) of analyzing the brain tissue sample comprises isolating nucleic acid from
4 the tissue sample, and contacting the isolated nucleic acid with an oligonucleotide
5 probe that hybridizes under stringent hybridization conditions to the Fra-1 nucleic
6 acid.

1 8. The method of claim 7, wherein the oligonucleotide probe further
2 comprises a detectable label.

1 9. The method of claim 1, wherein the Fra-1 marker is a Fra-1 protein.

1 10. The method of claim 9, wherein the Fra-1 protein is a native Fra-1
2 protein.

1 11. The method of claim 9, wherein the step (A) of providing a brain
2 tissue sample comprises obtaining the brain tissue sample from a human subject; and
3 the step (B) of analyzing the brain tissue sample comprises contacting at least a
4 portion of the brain tissue sample with a probe that specifically binds to the Fra-1
5 protein.

1 12. The method of claim 11, wherein the probe comprises a detectable
2 label.

1 13. The method of claim 11, wherein the probe comprises an antibody.

1 14. The method of claim 13, wherein the antibody is a polyclonal
2 antibody.

1 15. The method of claim 13, wherein the antibody is a monoclonal
2 antibody.

1 16. A method of modulating Fra-1 gene expression in a brain cancer cell
2 comprising the steps of:
3 (A) providing a brain cancer cell that expresses a Fra-1 gene; and
4 (B) introducing into the cell an agent that modulates the expression
5 of the Fra-1 gene in the cell.

1 17. The method of claim 16, wherein the agent is an oligonucleotide.

1 18. The method of claim 16, wherein the agent is an antisense
2 oligonucleotide.

1 19. The method of claim 18, wherein the antisense oligonucleotide
2 hybridizes under stringent hybridization conditions to a polynucleotide that encodes a
3 Fra-1 protein.

1 20. A method of inhibiting VEGF-D gene expression in a brain cancer cell
2 comprising the steps of:

3 (A) providing a brain cancer cell that expresses a VEGF-D gene
4 promoter and a Fra-1 protein; and

5 (B) introducing into the cell an agent that interferes with binding of
6 the Fra-1 protein to the VEGF-D gene promoter.

1 21. The method of claim 20, wherein the agent specifically binds a c-Jun
2 protein.

1 22. The method of claim 20, wherein the agent specifically binds Fra-1
2 protein.

1 23. The method of claim 20, wherein the agent specifically binds the
2 VEGF-D promoter.

1 24. The method of claim 20, wherein the agent is a variant of a native c-
2 Jun protein that binds the Fra-1 protein but lacks the ability to bind a VEGF-D gene
3 promoter.

1 25. The method of claim 20, wherein the molecule is a variant of a native
2 Fra-1 protein that binds a c-Jun protein but lacks the ability to bind a VEGF-D gene
3 promoter.

1 26. The method of claim 20, wherein the step (B) of introducing an agent
2 that interferes with binding of the Fra-1 protein comprises introducing an expression
3 vector having a nucleic acid encoding the agent into the cell.

1 27. The method of claim 26, wherein the agent is an antisense
2 oligonucleotide that hybridizes under stringent conditions to a polynucleotide that
3 encodes a Fra-1 protein.

1 28. The method of claim 26, wherein the agent is a variant of a native c-
2 Jun protein that binds the Fra-1 protein but lacks the ability to bind a VEGF-D gene
3 promoter.

1 29. The method of claim 26, wherein the agent is a variant of a native Fra-
2 1 protein that binds the c-Jun protein but lacks the ability to bind a VEGF-D gene
3 promoter.

1 30. The method of claim 20, wherein the brain cancer cell is contained
2 within the cranium of a human subject.

1 31. The method of claim 30, wherein the agent is administered to the
2 human subject by parenteral administration.

1 32. The method of claim 31, wherein the parenteral administration is
2 intravenous or intraarterial injection.

1 33. The method of claim 32, wherein the agent is introduced by injection
2 into the cranium of the human subject.

1 34. A method of identifying a test compound that modulates expression of
2 a Fra-1 gene in a brain cancer cell, the method comprising the steps of:

- 3 (A) providing a brain cancer cell expressing a Fra-1 gene;
4 (B) contacting the cell with the test compound; and
5 (C) detecting a modulation in the expression of the Fra-1 gene,
6 wherein detecting the modulation indicates that the test compound modulates
7 expression of the Fra-1 gene.

1 35. The method of claim 34, wherein the cell is derived from a tissue
2 sample isolated from a human brain.

1 36. The method of claim 34, wherein the step of detecting the modulation
2 in the expression of the Fra-1 gene comprises analyzing the cell for a change in the
3 amount of a Fra-1 marker in the cell.

1 37. The method of claim 36, wherein the Fra-1 marker is a Fra-1 nucleic
2 acid.

1 38. The method of claim 37, wherein the Fra-1 nucleic acid is an RNA.

1 39. The method of claim 37, wherein the Fra-1 nucleic acid is a native Fra-
2 1 nucleic acid.

1 40. The method of claim 36, wherein the Fra-1 marker is a Fra-1 protein.

1 41. The method of claim 40, wherein the Fra-1 protein is a native Fra-1
2 protein.

1 42. A method for inhibiting angiogenesis associated with a brain cancer in
2 a subject, the method comprising the steps of:

3 (A) providing an agent that interferes with Fra-1 binding to a
4 VEGF-D gene promoter; and

5 (B) administering the agent to the central nervous system of the
6 subject in an amount effective to inhibit blood vessel development associated with the
7 brain cancer.

1 43. The method of claim 42, wherein the agent specifically binds a c-Jun
2 protein.

1 44. The method of claim 42, wherein the agent specifically binds a Fra-1
2 protein.

1 45. The method of claim 42, wherein the agent specifically binds the
2 VEGF-D gene promoter.

